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The number of college students with disabilities has increased steadily as a result of federal legislation mandating access to education. This qualitative study explored experiences that 10 science faculty members had with disabled college students. Ss participated in open ended interviews. Of primary importance were curricular and instructional modifications and knowledge regarding university resources and legal responsibilities. Findings indicated that the majority of faculty members, although willing to make accommodations, were unfamiliar with available resources, were unclear about the university's legal responsibilities, and for the most part made accommodations based on the approach of the student. (Author)

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CASE STUDIES OF UNIVERSITY SCIENCE FACULTY: EXPERIENCES WITH STUDENTS WITH DISABILITIES

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The number of college students with disabilities has increased steadily as a result of federal legislation mandating access to education. This qualitative study explored experiences that science faculty members had with disabled college students. Ten subjects participated in open-ended interviews. Of primary importance were curricular and instructional modifications and knowledge regarding university resources and legal responsibilities. Findings indicated that the majority of faculty members, although willing to make accommodations, were unfamiliar with available resources, were unclear about the university's legal responsibilities, and for the most part made accommodations based on the approach of the student.

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CASE STUDIES OF UNIVERSITY SCIENCE FACULTY: EXPERIENCES WITH STUDENTS WITH DISABILITIES

I. INTRODUCTION

"Disabled people have been out of the mainstream of American life for two hundred years. And these years have seen the construction of modern American society--its values, its heritage, its cities, its transportation and communication network....Today disabled people seek very basic rights....They want an education--and they are turned away..." (Bowe, 1978). The number of students with disabilities enrolled in institutions of higher education has increased significantly as a result of federal legislation. Section 504 of the 1973 Rehabilitation Act requires that colleges and universities receiving federal financial assistance make their programs accessible to qualified handicapped students.

Although there are more students with disabilities enrolled in colleges and universities, little is know about the nature and quality of education that they are receiving. To date, too few studies have been completed to begin to understand the impact of Section 504 on institutions of higher education. Studies that have been conducted focus on architectural modifications and related costs (Wulfsberg and Peterson, 1978) or attitudes of faculty (Fonosch, 1979).

Simply removing architectural barriers will not guarantee that handicapped students will be able to participate in or receive the benefits of higher education. Program access is not simply a matter of ramps, elevators, readers or tapes. It is also a matter of attitudes of faculty (Jastram in Redden, 1979). The extent to which faculty members adjust curriculums and courses to meet the needs of qualified handicapped students will be the true test of how handicapped students will fare in the higher education community.

One portion of Section 504 deals specifically with the area of "academic adjustments" (CFR Sect. 84.44, 1977). This section of the regulations requires that faculty members attempt to adjust courses and curriculums in a variety of ways in order to individually accommodate qualified handicapped students. Adjustments mentioned include: more time to complete degree requirements; substituting required courses; providing auxiliary aids; and adapting the manner in which courses are taught.

In effect, the faculty member is entrusted with the responsibility of making two major decisions. The first decision is the academic and technical requirements that appear to be essential to the course/curriculum. The second decision is how qualified the handicapped student is in relation to these essential course/curriculum requirements.

Within the elementary and secondary education systems the academic decision making process includes checks and balances. Academic decisions are initiated by a teacher trained in special education. A myriad of other specialists are available to provide additional data on specific problems. All data are combined and decisions are made by a team, which includes the parent, to further assure equity and appropriateness. Ultimately, the team refines the decisions and collectively decides how to meet the child's needs in the most effective manner.

In higher education there is no official team approach. Faculty members rarely collaborate with each other. Academic decisions are the sole domain of an individual professor.

II. PURPOSE OF THE STUDY

The purpose of this research was to examine the experiences that a select group of science faculty had with disabled college students in order to begin to understand how students with disabilities were being accommodated and what factors influenced accommodation decisions. How prepared were faculty to be able to analyze curriculums, make judgements regarding essential academic and technical requirements, and evaluate the qualifications of a particular disabled student? The majority of faculty are experts in their field, not in teaching. Few have had courses in college teaching or curriculum design. An even smaller number have had courses in the education of handicapped students.

The researcher systematically explored the full range of idiosyncratic experiences that science faculty had with disabled students using a general interview guide approach. The following focusing questions formed the nucleus of this study:

1. What background/expertise do these faculty members have?
2. What contact have these faculty members had with students with disabilities?
3. What opinions do these faculty members have about the policy of the university toward the education of disabled students?
4. What do these faculty members know about legislation dealing with the post-secondary education of disabled students?
5. What contact have these faculty members had with people (other than students) with disabilities?

The aforementioned questions formed the framework for the general interview guide.

III. METHODOLOGY

Due to the paucity of data available on the experiences of faculty members with disabled college students, the

researcher selected a qualitative approach which allowed for an in-depth exploration of these data. A general interview guide, as discussed by Patton (1980) and Bogdan and Taylor (1975) was developed.

A list of general issues was gathered from the few studies conducted in higher education and from an analysis of findings from a federally funded project known as Project HEATH (Higher Education and the Handicapped). A content analysis was performed on HEATH projects with faculty members, through the American Association of University Professors and through another study conducted under the guidance of the National Association of College and University Business Officers. A panel of experts composed of a Disabled Student Services coordinator, university administrator, HEATH project director, social science researcher, disabled college student and a faculty member reviewed and revised the general interview guide.

The interview guide was field tested with science faculty members in institutions other than the one selected for this study. The format and questions were modified and revised further.

The study was limited to science faculty in one state university. Science programs were chosen because of the variety of instructional methods possible in the lecture

and laboratory and because the literature indicated that disabled students were frequently excluded from science courses (Redden et al., 1979). To minimize the variance in financial expenditures, facilities, and policies, the study was limited to a single institution.

A contact person, through whom academic modifications were channeled, was selected from each of the following departments: Botany, Chemistry, Computer Science, Geology, Physics, and Zoology. The contact person supplied the researcher with a list of faculty who had had at least one student with a disability. The researcher contacted all faculty listed and those who agreed to participate were interviewed.

A total of eighteen interviews were conducted. For purposes of this paper an interim report based on ten cases is presented. The following figure details the total group by discipline:

Discipline	Number of Faculty Members
Botany	3
Chemistry	2
Computer Science	4
Geology	3
Physics	2
Zoology	4

Figure 1.

Each interview was taped and transcribed. The researcher reviewed each tape and scored the corresponding transcript according to each of the five focusing questions with an additional category entitled "other" added. Case records (see Patton, 1980) were then prepared. Based on notes and case records the researcher developed narratives for each one of the ten cases. After individual narrative summaries were developed, a cross case analysis was performed. The analysis plan incorporated the focusing questions and included an investigation of thematic concerns expressed by the subjects. Based on these initial findings a discussion including some early recommendations will be presented.

IV. FINDINGS

A. Background Information on Faculty

The sample consisted of 10 faculty members, seven males and three females. Two held the rank of professor, six associate professors and two were instructors. Of the 10 individuals, three were from the botany department, three from zoology and one from each of the following departments: chemistry, computer science, geology, and physics. As far as years at the university, the range was from five years to 19 years with the mean equal to 11 years.

In examining the responsibilities and courses taught by the subjects, several things were revealed. Seven subjects stated that they taught and conducted research. Three individuals taught and did not conduct research. Four subjects had the responsibility of coordinating the laboratory experience for a specific course. Other responsibilities varied from assisting a professor, to acting as an associate department chair, to chairing the faculty senate.

The courses taught by subjects varied greatly from introductory courses for science majors to introductory courses for non-science majors to advanced graduate level seminars. Just as the content of the courses varied, so did the variety of instructional methods employed. For example, some courses tended to be very visual in nature. The professor who taught the introductory geology course used 3,000 slides. The physics courses relied upon live demonstrations. The computer science professor did not use notes but chose to write and draw everything from memory on the blackboard.

Other professors stated that the auditory portion of the course was more critical than the visual. In other words, it became less important for the student to see something than it did for the student to hear something. The problem was complicated further by the difficulty of getting interpreters who were conversant in science terminology. One professor found that using an interpreter who was unfamiliar

with botany was less helpful than writing notes to the student. However, when an interpreter who was familiar with the subject matter was employed, the discussion between student and teacher was simplified.

The laboratory experiences were also diversified. At the introductory level some courses required labs, like chemistry and zoology, while others either did not have lab components, like physics, or the lab component was optional, like geology. The skills required for the lab varied from fine motor manipulations in chemistry to observation in geology.

Exams and assignments were quite diverse in nature, usually directly proportional to the number of students in the class or lab. Many professors with enrollments over 100 utilized a computer scored multiple choice exam. Other variations of exams included short answer, fill in the blank, and essay. In some cases students were tested in lab by paper and pencil exercises while other lab exams involved real life situations where live plant material was assembled and students recorded responses based on observations under the microscope or visible plant materials.

Likewise, the required assignments varied from none (exams only) to weekly homework problems (physics) to extensive research and term papers. Upper level undergraduate courses and graduate courses almost always required a major written assignment of some kind.

B. Contact With Disabled Students

1. Number and Type of Disability

One of the initial research questions posed was: What contact has a select group of faculty members had with disabled college students? The 10 faculty members reported having had contact with 43 disabled students. The majority of the students (24) were either physically disabled or visually impaired. Other disabling conditions included: hearing impairments, learning disabilities, mental illness, and epilepsy. Of the total group of disabled students, 19 were men and 14 were women. By far, the majority were undergraduate students (36).

The researcher distinguished between contact and extensive contact based on whether or not the professor related any significant interaction with the student, e.g., lengthy discussion, academic accommodation, etc. Of the 43 students reported, contact with 22 of those students was judged to be extensive. In that sub-group of 22 students, 18 were either physically disabled or visually impaired. Of the remaining four, two were hearing impaired, one had a seizure-like disorder and one was classified as mentally ill.

An examination of the number of disabled students per professor revealed a range of two to 11, with the average number

of contacts,equal to four. The extensive contact, per professor, ranged from one to four with two being the average number of extensive contacts.

2. First Encounter With Disabled Student

By far, the most frequently occurring way in which a faculty member encountered a disabled student was by a student initiated contact. Students sought out faculty members once the course had begun. The zoology instructor reported hearing a student's electric wheelchair coming down the hall. Some contacts involved asking general questions while others related to assignments or exams.

The second most common method was also student initiated. Some students chose to contact the professor prior to enrolling in the course. Several visually impaired students inquired about the text so that they could get it taped ahead of time. One visually impaired woman, who was described as begin very persistent, contacted the chemistry department ahead of time and made it very clear that she did not want to have the lab requirement waived. Because time constraints were not tight the chemistry department had time to assess what would be required to facilitate her participation in the lab and accommodated her accordingly.

The third most common way in which a faculty member learned about a disabled student was through the professor noticing the student and subsequently initiating contact. Sometimes this meeting occurred rather routinely with the professor going over to the student and letting the student know that if he/she has any problems to please let the professor know.

Other times this meeting was rather irregular. Two such examples were one where the student had a seizure and another where the student would sporadically get down on his hands and knees and start barking. In both instances the student's outburst was what attracted the professor and required him/her to respond.

Other instances of first encounters varied from a student's mother contacting the professor at home the semester before the course began to one professor informing another professor about a particular disabled student. In only one case did a professor report learning about a student during registration or receiving a memo from the Disabled Student Services office.

3. Issues Related to Courses

The bulk of the data gathered during the interviews consisted of idiosyncratic ways in which faculty members accommodated disabled students. The researcher

chose to group those accommodations first, into lecture, lab, or general and second, into subgroupings. The subgroups of the lecture portion included: teaching style, professor's notes, equipment/auxiliary aids, assignments, exams, and grading. The lab subgroups were similar but included the additional categories of policy and scheduling. Finally, the general group comments were divided into: advising, knowledge of Disabled Student Services office, and other considerations.

a. Lecture Portion

- Teaching Style

One of the botany professors and the computer science professor gave examples of altering their teaching style by adding more verbal description for visually impaired students. Furthermore, the botany professor related doing the opposite for a deaf student. He consciously chose to add more diagrams and, in effect, increased the visual component of the course.

On the other hand, the physics professor and one of the zoology professors commented that, although a sensory impaired student might benefit from increased verbal or visual input, altering teaching style would be neither practical nor possible.

One unique adjustment made by one of the zoology professors was getting used to hearing questions from the

student's aide and then responding to the student instead of the aide. The natural tendency was to respond to the aide and ignore the student.

Other alterations in teaching style included: watching the disabled student more carefully than other students, ignoring bizarre behavior, and creating a relaxed atmosphere. One of the botany professors agreed to let a physically disabled student enter the class late although it was very disruptive to the class and to his lectures. The student was forced to follow an intricate path due to the relative inaccessibility of the building and there was no way he could arrive on time.

- Professor's Notes

Some professors appeared to be very generous with their notes while others were very parsimonious Four professors, three botany and one computer science professor, xeroxed a complete set of their notes for the student. In fact, two of those professors stated that giving a set of their notes to the student actually forced them to improve their notes.

The physics professor and one of the zoology professors adamantly refused allowing students access to their notes. The zoology professor elaborated on his viewpoint

by adding that having his notes would probably make it easier on the student but the student could learn more in a stressful situation in which he did not have access to the notes.

- Special Equipment/Auxiliary Aids

Of all the disabled students encountered, a relatively small number utilized special equipment or auxiliary aids. Four students, two visually impaired and two physically disabled, used their own tape recorders to tape the lectures. One professor provided further assistance to a physically disabled student by assigning a student to plug in the tape recorder for him.

Four students utilized special equipment which, with the exception of the braille computer terminal, was very simple. One of the zoology professors arranged for a student in a wheelchair to have a table over his chair so he would have a substantial writing surface. She assigned a teaching assistant the responsibility of taking out the table for each class session. Two other visually impaired students used magnifiers which were kept in the library. The most technical piece of equipment was a braille terminal which the Computer Science Department purchased several years ago and had been used by several visually impaired students.

Two professors reported deaf students using interpreters. One remembered seeing someone in the front of her class and, at first glance, thought they were making fun of her lecture. The other student only used an interpreter for the orals for his master's and doctoral exams. The first time the interpreter was unfamiliar with the technical language and the process was cumbersome. The second time the interpreter was a chemist whose familiarity with science helped in the botany area. At other times communication with the deaf student was done by exchanging notes. Both professors who had him in class stated that note exchange took two to three times as long but it worked well. This student was asked to raise his questions before or after class.

- Assignments

No modifications were made on the nature of assignments. Two professors reported accepting late papers without penalizing the student. The physics professor allowed a student to turn in a paper for extra credit. The quality of the paper was poor and did not raise the student's grade.

- Exams

Of all the areas in which faculty members accommodated disabled students, exams proved to be

the most frequently occurring area mentioned. Within exams there were nine different ways faculty members made adjustments. By far the overwhelming way was to allow students to have more time on exams. Of the 43 students encountered, 11 were afforded more time on exams. Some students were given twice the amount of time while others were given unlimited time. Some students, in the final analysis, were given extra time but did not need it. Other students were given unlimited time and still could not pass the exam.

As far as other special arrangements made regarding exams, seven students were allowed to take their exams at the DSS office while four professors chose to personally read the exam to the student. Two of those professors mentioned that making arrangements at the DSS office was more hassle than doing it themselves. Several professors who read exams to students questioned the validity of that process. One mentioned the tendency for his speech intonation to point to the answer while another one cited his response to the student's verbalizations in itself prejudiced the process.

Three professors actually designed different exams for the student. One was a multiple choice exam he used for classes when the enrollments were larger. Another professor discussed how she subdivided essay questions which required shorter responses so that the student with

cerebral palsy could recite the responses easier. The third example was where one of the botany professors found out that his deaf graduate student needed a lot more time on exams so he designed a special, more comprehensive exam, and let the student take it home to complete it. The same botany professor exempted a visually impaired student from the portion of the exam that required identification of diagrams and did not penalize her.

Other accommodations involved logistics. Four professors simply arranged for a separate room for the student while three allowed others to assist in the process of the exam (teaching assistant, aide, student's mother). One professor spent an entire weekend hand printing, in one-inch letters, a copy of the exam so a visually impaired student could read it.

- Grading

For the most part, grading was routine. One professor gave a disabled student an incomplete. One professor stated that he was a "bit generous" with a grade that he gave a disabled student because of her perseverance.

Perhaps the most unusual situation was one in which, after an entire semester and several failing grades on exams,

rather than give the disabled student an "F," the professor chose to initiate a retroactive drop. Throughout the semester the professor had made numerous attempts to get the student to first, change into the non-science majors section and second, to drop the course. Even though the student did not heed the professor's advice, the professor still chose to initiate the retroactive drop which she had never used before that point.

b. Laboratory Portion

- Policy

The only lab-related policy issue that arose involved a description of an unofficial policy in the chemistry department whereby disabled students chose the option of taking the lecture portion of the course without the lab. In this case special permission was granted from the Provost at which time the course became a three credit course instead of a four credit course.

Many professors who had had disabled students in the lecture course, but not in the lab, stated that they would "bend over backwards" in the lecture portion but "draw the line" in the lab. Several professors expressed concern about safety issues. Another group mentioned how it would be unfair to have a disabled student observe but not

participate. Still another faction did not feel that disabled students posed that serious of a problem in the lab.

- Again, drawing from the chemistry department, before allowing a visually impaired student to take a lab they required that she complete a series of tasks in the lab so that they could assess her abilities and limitations. Based on this pre-test they required her to have one-to-one supervision by a teaching assistant who was funded by the DSS office.

- Scheduling

The most common occurrence was for disabled students to have some special scheduling arrangements. Of the six students who received special scheduling, some were scheduled for the last lab of the day to have more time, one was allowed to attend two different sections to cut down on the days he had to be on campus. Several others were scheduled for a lab section because a judgement was made, usually by the professor of the course, that a particular lab instructor would be more receptive to the disabled student. By the same token, two lab instructors selected a particular lab partner, usually an "A" student, to assist the disabled student.

- Teaching Style

One professor described the use of a technique in a zoology lab that they had not used for several years. This technique involved projecting slides onto a screen to show students exactly what they should be looking for under the microscope. For the non-disabled students this procedure slowed them down and was unnecessary. On the other hand, it enabled a visually impaired student to see things greatly magnified. One of the botany professors prepared detailed handouts for a deaf student so that he could perform the lab tasks without hearing the directions.

Another commonly described occurrence, that was a function of having a disabled student in lab, was the overall professor of the course worked more closely with the lab instructor or teaching assistant. For the most part, professors allowed the lab instructors to function autonomously, in some cases the disabled student facilitated an ongoing dialogue between the professor and the instructor.

Although teaching assistants functioned as teachers, they were also graduate students. For purposes of this study disabled teaching assistants (TA) were treated as students. Two cases of students complaining about hearing impaired teaching assistants were mentioned. One involved the

difficulty of the TA facing the blackboard to write on it and being unable to field questions from the class. Another situation was similar but appeared more serious because students claimed that this particular teaching assistant was ignoring all their questions. The teaching assistant had not revealed her hearing impairment, figuring that concealing her deficit would be safer. The lab supervisor finally figured out what was happening and called her into her office to let her know that her hearing impairment was not a problem per se, but her attempt to conceal her disability was, in fact, causing other problems and alienating students.

- Special Equipment/Auxiliary Aids

The only piece of special equipment in use that was mentioned was a small stool on which to place a microscope so that a student in a wheelchair could look down into the microscope. Three professors (botany, chemistry, and zoology) recalled seeing a demonstration of a self-contained accessible lab station which their respective departments were considering buying. Apparently, none were purchased. The professors, while on one hand assumed that the demand was insufficient, on the other hand readily discussed how having a piece of equipment like that could in itself create a demand.

The issue of having an assistant in the lab was discussed. Two students had aides with whom they worked. Although the professors were unsure as to where arrangements for the aides had been made, they were most likely hired by the DSS office. As mentioned previously, the chemistry department insisted that a visually impaired student have her own teaching assistant in order to participate in the lab. The funds for the teaching assistant came from somewhere other than the chemistry department, probably the DSS office.

- Assignments and Exams

On two occasions disabled students were exempted from assignments or portions of assignments that were determined as non-essential. In a zoology lab students were required to prepare a written report and present a brief oral summary. The zoology instructor did not require a cerebral palsied student to present the oral report because she did not want to subject him to that experience and she did not feel that there would be enough time for him to do it.

In another situation, a physically disabled student was not required to complete a dissection because the dissection itself was not the focus of the exercise. The professor remarked, that if the course had been a more advanced zoology course, then the dissection would have been more essential.

One of the botany professors designed a separate lab practical for a visually impaired student. He attempted to use models and larger materials to simulate the items that required identification.

4. General Issues Related to Disabled Students

- Advising

One of the zoology professors recounted how he had discouraged a student from taking his course. A visually impaired student came to him prior to enrolling in the course, to discuss the requirements. At that time the student asked the professor for his notes. He stated that the student's approach insulted him because he felt the student was trying to get him to make concessions. As a result, he discouraged the student from taking the course. The student did not persist.

On the other hand, one of the botany professors reported feeling afraid when, two weeks after the semester started, a student in a wheelchair rolled into his class. The professor candidly pointed out that because two weeks of the semester had elapsed, he could have refused to allow the student admission into the course. Rather than discourage the student he encouraged him and began planning ways to facilitate the student's participation.

Another botany professor reported advising a physically disabled student to switch from a science-majors section to a non-science majors section because she did not feel that the student would pass the course in which she was enrolled. The student did not heed the professor's advice and after several failing grades the professor then advised the student to drop the course. Again, the student did not act. The end result, reported in the grading section, was that the professor initiated a retroactive drop for the student, thereby eliminating the possibility of having to give the student an "F."

Several professors reported referring disabled students to the counseling center or to psychiatric help at the infirmary. In addition, referrals were made to the reading and study skills center.

- Disabled Student Services Office

Of the 10 faculty members interviewed, nine knew that the DSS office existed and one did not know of its existence. Seven of the nine had learned about it from a student and two had learned from a peer.

Although faculty members knew of the existence of the DSS office, few perceived that the services available extended beyond giving exams. In reality there are many services available from auxiliary aids to consultation about accommodation

strategies. A few faculty members perceived that using the DSS office would be a hassle. Their perception was based, not on past experiences or rumors about that office but, on their perception of using any university-wide resources.

The one faculty member who acted as a special assistant to the President of the university stated that he knew very little about this office or their budget. He emphasized the importance of the Director of this office taking a lobbying role and being a strong advocate for disabled students.

- Other

There was a variety of other things which faculty members did for disabled students. The building in which the botany department was housed was accessible with assistance. Students could get to upper level floors via an elevator. Since the elevator was locked, students had to get a key in order to use the elevator. One professor met the student before and after each class to unlock the elevator.

Another one of the botany professors noticed how anxious a physically disabled student was about the bus not showing up. To relieve the student's anxiety, the professor walked him to the bus and waited until the bus came. On several occasions he called the bus system to see why it was late. The same professor agreed to wheel out the student on days when his electric wheelchair was being serviced.

The other area discussed was individual tutoring. One of the botany professors reported tutoring a student on study skills three times a week. A zoology professor tutored a disabled student on zoology three times a week. After the zoology department developed supplemental aides and materials to assist all students, the professor's tutoring was no longer necessary.

The final issue raised was safety. One of the zoology professors developed an emergency plan, in the event of a fire or bomb threat, to evacuate a physically disabled student. She assigned students to carry him out of the lecture and lab.

Another zoology professor was required to call the rescue squad and administer basic first aid to a student who had a seizure during his lecture. As a result of that experience the professor enrolled in a basic first aid course.

C. Opinions of University Policy Toward Disabled Students

On a philosophical level every faculty member (10) interviewed felt that the university should provide an education for handicapped students. Seven subjects immediately qualified that statement by commenting on the limitations necessary. Limitations due to financial resources or due to the student's disability.

The geology professor, although realizing that the university was making some accommodations for disabled students, seriously questioned the extent of the university's commitment. He felt that additional things would be happening if the university were more committed. The chemistry professor commented that the university's focus on research, in effect, interfered with the education of handicapped students because in order to educate handicapped students, professors needed to be good teachers. The research focus de-emphasized teaching, thereby having the net effect of professors being disinterested in academic accommodations.

Several professors mentioned that the reward system worked in opposition to the education of disabled students. By rewarding people for research and publishing you discouraged faculty members from spending the time they might need to spend with disabled students.

Two subjects suggested resource strategies. One suggested that the university should subsidize departments who are willing to accommodate disabled students. Another professor suggested that the state legislature should consider a special appropriation for the education of disabled students.

Four professors raised the issue of separate programs for disabled students. Some suggested separate lab sections and separate courses, while others suggested separate programs

within universities so that certain universities would have special programs for deaf students or blind students, for example.

D. Knowledge of Section 504

Two professors knew that a federal law protecting the rights of disabled people existed, one of them identified Section 504. Four professors had a vague notion. They made statements like: "The government must have something to do with these ramps or the university wouldn't be going this if they didn't have to."

Nine subjects construed the law's meaning to be architectural accessibility only. One subject made reference to architectural accessibility and some programmatic ways to make education accessible to disabled students.

E. Contact With Disabled Persons (Other Than Students)

In general, subjects' contact with other disabled persons was limited. For six of the 10 faculty members the most extensive contact they had ever had was with the disabled students at the university. Two professors reported having a disability themselves. One had a hearing loss and the other, although he did not elaborate on the condition, emphasized that he had had a disability and had overcome it.

One professor reported having two disabled family members, a brother who was mentally retarded and a cousin who had cerebral palsy. The same professor also had a friend with a disabled daughter. Another professor discussed two sets of friends, one who had two children who were mentally retarded and another who had a 28 year old daughter who had "never been out of bed." One of the botany professors recalled how her experiences with a childhood friend who had spina bifida had opened her eyes to the discrimination disabled people sometimes experience.

Other contact mentioned ranged from the geology professor's vicarious contact through his brother who taught special education to the remembrances of another faculty member about her sister receiving severe burns and having to entertain her while she was treated for the burns. Two professors mentioned aging parents as contact with people who were becoming hearing impaired.

Half of the sample commented on either having met or knowing the zoology professor on campus who is blind. The computer science professor reported having contact with a computer scientist who doesn't have any arms who key punches with his feet. The physics professor added his knowledge of a brillant physicist who had multiple sclerosis and remains very productive. Other acquaintances included one professor who had deaf neighbors and another who knew a few people at Gallaudet.

V. DISCUSSION AND RECOMMENDATIONS

A. Discussion

This paper attempted to give the reader an idea of the problem studied, qualitative methodology employed, and an initial view of subsequent findings based on an analysis of 10 of the 18 cases. Similarly, the discussion and recommendations that follow offer a starting point from which ideas concerning other research possibilities could emanate.

The discussion section was broken down into the five focus areas: background information, contact with disabled students, opinions of university policy toward disabled students, knowledge of Section 504, and contact with disabled persons (other than students). A sixth category entitled "Other" was added to highlight interrelationships between and among the five areas and any other significant themes.

1. Background Information

An examination of background information revealed several general tendencies. It appeared that the instructor level teachers both had more time and were more willing to make accommodations than either the associate professors or full professors. In fact, it appeared as though the two instructor level teachers were on the end of a continuum

which represented maximum time and maximum willingness to accommodate while the full professors were on the other end of the continuum with minimal time and minimal willingness to accommodate.

Most of the associate level teachers were willing to accommodate but appeared to have less time due to research responsibilities. The two associate level professors with joint appointments between education and science were very receptive to accommodating students. The chemistry teacher remarked: "I think I've thought about these issues more than most...in chemistry. You shouldn't look upon me as a typical drone because I have a joint appointment" (C.S.#4:1*).

The two instructor level teachers had both taught high school. In evaluating their accommodations it seemed as though both of them made accommodations that might be considered more than what was required and in reality have the net effect of being negative. One instructor allowed a student to drop the course after she had completed the course and failed all the exams. The other instructor exempted a speech impaired student from an oral report and some laboratory assignments. The possibility exists that experience in a secondary educational setting might influence how much leeway a teacher gives a college student.

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*Verbatim quotes from transcripts of interviews are referred by case study number and page number.

Although the numbers were very limited, it appeared that most teachers did not work together to accommodate disabled students, with the exception of the teachers in the botany department. The three botany teachers collaborated and shared information on techniques and the services offered by the Disabled Student Services office. This collaborative effort appeared to have a positive impact upon accommodations made.

All of the zoology professors had had significant contact with the zoology professor who is blind, Dr. B. The experience with Dr. B. appeared to have different effects from one teacher to another. The professor level person used Dr. B. as a yardstick against whom he measured other disabled students. The associate professor and the instructor both looked at Dr. B. as an extraordinary person and did not expect disabled students to measure up to him.

Perhaps more important than rank or discipline was how an individual viewed his/her role as a teacher. In general, teachers who viewed their primary role as either research or administration were less willing and less likely to make accommodations for disabled students. On the other hand, teachers who felt strongly about teaching were more willing and more likely to make accommodations.

One way a teacher's perception of his/her role became evident was how he/she viewed modifications in teaching style and use of his/her notes. The two professors who did not perceive teaching as their primary role were unwilling to modify their teaching style or give a student access to their notes. One of the two professors stated: "I have a style of teaching which...is basically effective. Let's suppose that there is one visually impaired student in the class. Shall I change my mode of speaking for one person? I don't think so" (C.S.#2:4).

The other one remarked that it might be easier for a student to have his notes but in the long run it would not be in the best interest of the student. He discussed his philosophy of achievement: "I don't think you should go overboard because I think there's something in achieving under slightly stressful conditions...." (C.S.#8:5)

Teachers who felt that teaching was their primary responsibility altered their teaching style and three teachers gave disabled students copies of their notes.

2. Contact With Disabled Students

Possibly the most compelling theme to arise was that, in general, whether or not a faculty member made an accommodation did not appear to be a function of background,

opinion of the university policy toward disabled students, knowledge of Section 504 or contact with other disabled persons. Accommodation seemed to be directly related to how the student approached the faculty member.

Students who contacted teachers prior to the course and requested realistic and fair accommodations seemed to fare the best. Students who contacted teachers prior to the course, who asked for things and did not follow through or asked for things which the teacher perceived as unrealistic or unfair did not do as well.

In the first case the student's inability to follow through with picking up a book predisposed the teacher to thinking that the student was irresponsible, which in turn made the teacher less willing to accommodate the student. In the case where the teacher perceived that the student was making unfair demands, the teacher strongly discouraged the student from taking the course and the student did not persist.

The chemistry teacher commented about one blind student's ability to get what she needed: "She was very political and she could make a real pain of herself at higher levels of the university. I think that's why she was able to get this [taking the lab portion of the course] worked out" (C.S.#4:3).

A second important theme centered on the faculty member's attitude toward the disabled student. In other

words, the extent to which the faculty member appeared to feel sorry for the disabled student and focus on the disability, as opposed to not feeling sorry for the disabled student and focusing on the disabled student as a person, appeared to influence whether or not accommodations were made and what kinds of accommodations were made.

Several circumstances were related to the researcher where faculty members felt sorry for a particular disabled student and subsequently made inappropriate accommodations. One of the botany teachers felt so sorry for a physically disabled student that the teacher allowed the student to drop the course after completing the course and failing all the exams. Another botany teacher's feelings for how difficult it was for a blind student to get to class and complete assignments made him be more "generous" with her final grade.

On the other side, it appeared that when teachers were able to overcome the tendency to look at the disability of the student rather than the ability of the student, teachers were then more able to make appropriate accommodations. Several teachers mentioned feeling terrified when they first met the disabled student but gradually getting to know the student greatly decreased their fear. The computer science teacher recalled his feelings about getting to know a blind

student who, at first, made this teacher very uncomfortable: "I usually fail to tell people that Dick's blind.... I call him [Dick] up and I honestly forget that he's blind" (C.S.#11:6).

Interestingly enough, although approach of disabled students and faculty attitudes are factors, whether or not a student appeared to be independent or dependent did not affect whether or not they received accommodations. In other words, just as many faculty members responded to students who were independent as did those who were dependent. Several faculty members responded to only independent students and several responded to both independent and dependent students. There did not appear to be any teachers who only responded to dependent students.

A theme that surfaced from an examination of the laboratory experience was the tendency to be protective of disabled students versus the tendency to treat them as normal students. The geology teacher felt that physically disabled students were frequently advised against enrolling in the lab because teachers perceived the field trips to be too rugged for the disabled students. In reality, although the trips were somewhat strenuous, many able-bodied students had difficulties. When some students experienced difficulties other students usually provided verbal and physical support.

The possibility existed that some of the requirements for one-to-one lab supervision were also overprotective. The chemistry department always required that level of supervision while the botany and zoology departments required one-to-one supervision in a few cases.

Opinions about the validity and fairness of observation in the lab appeared to be polarized. The chemistry teacher and one of the zoology teachers felt strongly that in order for a student to be enrolled in a lab course he/she must participate actively. The other zoology teachers and the botany teachers felt that a student could observe and, in effect, learn vicariously. They did not feel that participation by observation was unfair.

3. Opinions of University Policy Toward Disabled Students

In a time of economic constraints it follows that, although every faculty member believed that the university should provide an education for disabled students, the majority of them immediately commented on limitations necessary due to economic problems. Of import is the fact that the overwhelming majority of accommodations made required little or no money.

The most frequently occurring accommodations included more time on exams and logistical arrangements. Even an examination of equipment revealed make-shift tables or stools which were readily adaptable.

In reality it would appear that the limitations would be due to time. Although the majority of accommodations did not require financial resources they did require additional time. Time as a commodity is perhaps as scarce as money.

Perception of time as a problem varied but not by actual quantity. Teachers who spent several hours per week with a student seldom complained if they felt the student showed progress. In fact, several teachers spent many hours with students who wound up dropping the course or doing poorly and the teachers still did not complain.

The teachers who complained about the time were the two full professors for whom teaching time appeared to be more of a problem than it was for the other teachers. Admittedly, several teachers stated that spending many hours with one student was okay but if there were three or four disabled students in one semester time would become a problem.

The botany professor stated that if he found himself spending too much time with disabled students he would have

to change what he was doing: "My profession is teaching botany, not handicapped students" (C.S.#3:21).

A second policy related theme was that a solution to educating disabled college students should be to provide "separate but equal programs." The geology professor felt strongly that, in a large university, disabled students fall through the cracks and the only fair way to educate them is to have separate, specially designed programs just for disabled students.

Other professors suggested that a certain university could specialize in a particular program for a particular disability group. The flavor of these comments was that, in order to really meet the special and unique needs of disabled students, exclusive programs must be developed. At no point did any teachers think of this concept as being unfair or discriminatory.

Perhaps the most telling comment which aptly stated a rationale for having a policy which promotes the education of disabled students was made by one of the botany professors: "A handicapped person who isn't educated is really handicapped" (C.S.#10:32).

4. Knowledge of Section 504

One of the primary implementation strategies for Section 504 has been to educate faculty members about the

law and corresponding regulations. A considerable amount of federal money has been spent in training faculty members.

Based on the interim findings of this study, whether or not a faculty member knew about the 504 requirements had little or no impact upon whether they made accommodations or the appropriateness of such accommodations.

Every faculty member, but one, thought that the sole 504 requirement involved architectural accessibility. The following comment typified the responses: "Physical access is important, everything else is not the university's responsibility" (C.S.#2:21). Ideas to modify courses seemed to be generated as a function of a teacher's perceiving that those accommodations were innate responsibilities of a teacher's job, not because of any federal legislation.

Two faculty members were quite vocal as to their feelings of resentment about the amount of money spent for architectural modifications which would ultimately benefit so few people. Although these faculty members readily voiced their feelings of resentment, it did not seem to affect whether or not they made accommodations. In fact, both of these teachers not only made accommodations, but they went out of their way to make accommodations for several disabled students.

5. Contact With Disabled Persons (Other Than Students)

Contact with disabled people, other than students, appeared to be an important variable. However, generalizations based on this variable were difficult to develop because so few teachers had had any substantial contact.

One zoology professor who had disabled family members and one who had close friends with disabled children were affected in different ways. The female instructor with disabled family members appeared to be overly helpful and somewhat protective of disabled students. The male professor appeared to be very concerned about not doing anything special for a disabled student. Perhaps his own disability, which he did not elaborate on, added to his philosophy. He recounted how he had had a disability but overcame it on his own. Based on this experience he seemed to emphasize the importance of disabled students not having it easy.

Another important idea arising was that the two teachers who had had experience with high level disabled professionals appeared to view disabled students as having great potential. They both were equally amazed at how much their disabled colleagues had achieved.

Finally, several teachers, in mentioning that their only experience with disabled people had been with disabled students, related how much easier dealing with disabled students felt after the first few times.

6. Other

Perhaps the most obvious general theme that occurred to this researcher was that faculty members dealt with disabled students as autonomously as they dealt with non-disabled students. In other words, faculty members made decisions, on their own, about all kinds of academic issues. The isolation of the decision making with disabled students appeared to be more problemmatic because faculty members made decisions without sufficient information about support systems, resources or their legal responsibilities. Furthermore, in general, they did not think to consult other peers, department chairs nor seek out possible university resources.

Many teachers stated that if they knew what resources existed or that other professionals were available to discuss strategies, they might be more inclined to accommodate disabled students. One question would be how to create a more effective Disabled Student Services office. A more basic question was whether administratively the DSS office would be

better placed somewhere else on the organizational chart or designed like the affirmative action model with people designated in each college.

Another strong motif was that, the more competent and articulate the disabled student appeared to be, the more likely he/she was in getting what he/she needed irrespective of the attitudes or experiences of faculty members. The implication being that if disabled students can become their own advocates, chances are they will receive a more equitable education.

B. Recommendations

The recommendations were divided into two areas. The first area was those recommendations that arose from themes surfaced from this interim analysis. The second area was those recommendations about different approaches to the topic of faculty members and disabled students.

Based on this interim analysis it appears that a further investigation of factors which influence faculty attitudes and behavior is critical. Factors such as approach of disabled student, type of disability, teacher's perception of his/her role and knowledge of Section 504 should be considered.

It appeared from the findings that the more contact a teacher had with disabled students the easier it became to make accommodations. An examination of amount and type of contact compared to amount and appropriateness of accommodations should be made.

The whole area of academic accommodations should be studied. The findings revealed an extensive list of many types of accommodations. A study examining the particular situation and the extent to which the accommodations met the needs of the student and met the legal requirements would shed additional light upon the nature of these accommodations.

In the same light, faculty members questioned whether accommodations they made were truly fair to the disabled student. Reading exams to students and redesigning exams were mentioned. A thorough analysis of those practices should be made.

It appeared that faculty members did not know much about the resources available through the Disabled Student Services office. The most effective approach to informing faculty members should be researched. Secondly, a variety of administrative options for the functioning of the DSS office should be examined. Case studies of different options should be designed to provide an in-depth view of the most functional system.

As a result of the uncovering of seemingly subtle discriminatory practices, like an unofficial policy to waive a lab requirement, a further exploration of other unofficial, but operational policies, should be conducted. The effects of those unofficial policies should be thoroughly examined.

Several faculty members stated that having disabled students in class seemed to have positive effects upon the attitudes and behaviors of other students. Studies designed to explore the impact of having a disabled student in a lab or class would provide valuable information.

Finally, an exploration of an effective program which could train disabled students in self-advocacy techniques is critical. An analysis of the longitudinal effects of such a program on the education of disabled college students should be made.

The second area of recommendations describes ways in which more data could be gathered which provides the researcher with a total picture of the experiences of faculty members with disabled college students. The general interview guide developed could be used with science faculty members in other types of institutions of higher education such as private universities, smaller colleges, and community colleges. Secondly, an examination of other groups of faculty members such as humanities, arts, engineering, etc., should be conducted.

Perhaps the most enlightening study would be exploring the area of faculty members and disabled college students from the perspective of the disabled students instead of the faculty members. A comparison of the faculty members' perspective and the disabled college students' perspective would be fascinating.

Finally, the researcher remains committed to the appropriateness of qualitative methods in this area. The possibility of using methods other than interviews, such as observation and perhaps document analysis, could provide additional meaningful data (Rist, 1982). Furthermore, the triangulation of those data sources could provide additional insight not currently available.

To reiterate, this report was based on the initial analysis of ten in-depth interviews with science faculty members regarding their experiences with disabled college students. The findings, discussion, and subsequent recommendations should be viewed as a starting point from which to examine other important themes and concerns.

Because more disabled students are being educated at the elementary and secondary levels, it follows naturally that there will be more disabled college students. Knowing how disabled students are being educated could shed light upon whether or not problems exist and possibilities of eliminating problems if they do exist.

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